(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 512 328 A1**

(12) **EUROPEAN PATENT APPLICATION**

(21) Application number: **92106925.8**

(22) Date of filing: **23.04.92**

(51) Int. Cl.5: **C11D 3/18**, C11D 3/43, A23P 1/00

(30) Priority: **06.05.91 US 695894**

(43) Date of publication of application:
11.11.92 Bulletin 92/46

(84) Designated Contracting States:
AT BE CH DE DK ES FR GB GR IT LI LU NL SE

(71) Applicant: **MILES INC.**
One Mellon Center 500 Grant Str.
Pittsburgh, PA 15219-2502(US)

(72) Inventor: **Barone, Patrizia**
1122 69th Street
Darien, Illinois 60559(US)
Inventor: **Endres, Michael T.**
2617 York Court
Woodridge, Illinois 60517(US)
Inventor: **Patel, Shanker B.**
16415 S. 84th Avenue
Tinley Park, Illinois 60477(US)

(74) Representative: **Dänner, Klaus, Dr. et al**
c/o Bayer AG Konzernverwaltung RP
Patentabteilung
W-5090 Leverkusen 1 Bayerwerk(DE)

(54) **Food safe cleaning composition.**

(57) Disclosed is a cleaning composition which comprises cold pressed citrus oil, an alkali metal carbonate and/or bicarbonate, an emulsifier/surfactant system, ethanol and propylene glycol. The composition is highly effective as a cleaner, especially for hard surfaces, and is sufficiently non-toxic to render it useful for cleaning surfaces used for food preparation without the necessity of rinsing.

butylated hydroxy anisole as antioxidant

EP 0 512 328 A1

Background of the Invention

United States Patent No 4,620,937 discloses a liquid mixture of distilled, stabilized citric oil; vinegar and water. The citric oil typically includes distilled D-Limonene, at a minimum of 50% and preferably at the 80% level; fatty acids and a non-ionic detergent for increased cleaning effectiveness. This formulation can cause eye irritations upon repeated long term contact, however. Futhermore, in US Patent No. 4,620,937 the addition of Aloe Vera juice to the formulation to protect the user's hands during use and to reduce the risk of skin irritation, is recommended.

In United States Patent No 4,808,330 there is disclosed a non-toxic formulation for cleaning fruits and vegetables which comprises sodium chloride, an alcohol and coconut oil in aqueous solution.

It is an object of the present invention to provide a cleaning composition that is safe for the cleaning of areas that come into contact with food and yet provides cleaning efficacy equivalent to cleaners containing harsh chemicals that are toxic if ingested.

Summary of the Invention

The present invention is an essentially aqueous, non-toxic, cleaning composition which comprises:

a) cold pressed citrus oil;

b) an alkali metal carbonate and/or an alkali metal bicarbonate in sufficient quantity to maintain the pH of the composition at a level of from 7.5 to 11;

c) an emulsifier-surfactant system comprising:

i. a mono fatty acid ester of polyoxyethylene sorbitan;

ii. a mixture of ethoxylated mono and diglycerides of stearic, palmitic and myristic acids;

iii. a tartaric acid ester of a mono or diglyceride; and

iv. sodium lauryl sulfate;

d) ethanol; and

e) a minor amount of propylene glycol.

Description of the Invention

There has now been found that a highly effective cleaning composition can be prepared using ingredients that are suitable for ingestion by humans to thereby provide a powerful cleaner which is suitable for cleaning foods and surfaces that come into contact with foods.

The cleaning composition is based upon cold pressed citrus oil as a cleaning and fragrance enhancing agent. This material is obtained by an ambient pressure extraction of the citrus fruits' peel. Various citrus fruits such as oranges, grapefruit, limes and lemons are suitable sources for this ingredient. Lemon oil is preferred for use in the present formulation which will typically contain from 0.05 to 10.0 weight percent (preferably 0.3 to 1.4%) of the citrus oil.

The composition also contains an alkali metal carbonate and/or bicarbonate to control the composition's pH as well as to provide a source of alkalinity for the saponification of fatty oils. Typically, there will be present a total of up to about 1.0% of one or a combination of both of these alkaline materials in sufficient amount to cause the cleaning composition to have a pH of from 7.0 to 11. In a preferred embodiment, there is present a combination of sodium carbonate and sodium bicarbonate wherein the weight ratio of carbonate to bicarbonate is from 1:9 parts carbonate to 1:10 parts bicarbonate. The amounts and ratio of carbonate and bicarbonate are preferably selected so as to provide a composition having a pH of from 8.5 to 10.4 which is regarded as particularly safe for contact with human tissue.

In addition to the citrus oil and carbonate/bicarbonate, the present cleaning composition contains an emulsifier/surfactant system comprising:

i. a mono fatty acid ester of polyoxyethylene sorbitan,

ii. a mixture of ethoxylated mono and diglycerides of stearic, palmitic and myristic acids,

iii. a tartaric acid ester of a mono or diglyceride, and

iv. sodium lauryl sulfate.

It is to be understood that a mixture of two or more ingredients from each of groups i, ii or iii above may be used without departing from the scope of this invention. The emulsifier/surfactant system which typically makes up from 0.15 to 5.0 (preferably 2.0 to 4.0) weight percent of the cleaning composition, serves the purpose of allowing the finished composition to wet out, penetrate and lift the soil from the surface being cleaned. It also emulsifies the soil to keep it in solution so that it can be wiped up with minimal, if any, redeposition. In addition to the performance attributes, this system is key to the physical stability of the

finished composition which is a microemulsion which requires sufficient levels of certain emulsifiers to keep it clear and prevent phase separation. More particularly, the sodium lauryl sulfate in the system provides wetting, penetrating and soil lifting attributes. The other three ingredients are all emulsifiers which suspend the lifted soils. More particularly, the preferred fatty acid ester of polyoxyethylene (where the fatty acid can contain from 12 to 18 carbon atoms) is prepared by esterification of sorbitol with primarily lauric fatty acid under conditions which cause the splitting of water from the sorbitol. The material is condensed with approximately 20 moles of ethylene oxide per mole of sorbitol to give it water solubility and can be obtained under the trade name Tween®, from ICI America Inc. This material will normally make up from 0.05 to 80 (preferably 50 to 65) weight percent of the emulsifier/surfactant system.

The ethoxylated mono or diglyceride are characterized by polyoxyethylene mono and diglycerides of stearic, palmitic and myristic acids. This material, which can be obtained under the tradename Durfax®, from Durkee, is normally present in an amount of from 0.05 to 20.0 (preferably 4 to 7) weight percent of the emulsifier/surfactant system.

The tartaric acid ester of a mono or diglyceride, which is normally used in an amount of from 0.05 to 20 (preferably 4 to 7) weight percent of the emulsifier/surfactant system is preferably a diacetyl tartaric acid ester of a monoglyceride and can be obtained under the trade name Panodan® from Grinsted Products Inc.

In addition, there is included in the emulsifier surfactant system from 0.05 to 40.0 weight percent (preferably 25 to 35) weight percent based on the emulsifier/surfactant of sodium lauryl sulfate which serves as a wetting agent to penetrate greasy, oily soils and help to lift them from the surface being cleaned.

Additional essential ingredients of the present cleaning composition are from 0.5 to 15.0 (preferably 2.5 to 7.0) weight percent ethanol which serves the dual function of drying agent and stabilizing agent to assist in maintaining the clarity of the finished composition. In addition, there is included 0.05 to 2.0 (preferably 0.2 to 0.8) weight percent propylene glycol which acts primarily as a cosolvent to aid in the wetting out and lifting of soils. It also imparts some shine to the substrate and since it is a humectant, it contributes to a soft hand feel.

In addition to the above described essential ingredients, there can be added minor amounts of non-essential materials such as fragrances, preservatives and dyes provided that they are selected from those which are regarded as safe for use on food bearing surfaces.

The present invention is further illustrated by the following examples in which all percentages are by weight of the entire formulation unless otherwise specified.

EXAMPLE I

A cleaning formulation was prepared according to the present invention containing the following ingredients:

Deionized Water	91.3293%
Trisodium citrate dihydrate	0.2500
Potassium sorbate	0.0500
Sodium bicarbonate	0.3000
Sodium carbonate	0.2000
Sodium lauryl sulfate (Stepanol WA-100®, Stepan)	0.5000
Ethanol	5.0000
IFF Fragrance #6703-AP (lemon)	0.1500
Cold pressed lemon oil (#3410-Sunkist)	0.5000
Butylated Hydroxyanisole (antioxidant)	0.0200
Polyoxyethylene (20) sorbitan monolaurate, Tween 20®	1.0000
Polyoxyethylene (20) mono and diglycerides of stearic, palmetic and myristic acids (Durfax EOM®-Durkee)	0.1000
Diacetyl tartaric acid ester of a monoglyceride (Panodan TR® -Grinsted Product Inc.)	0.1000
Propylene glycol	0.5000
F.D. & C. Yellow #6 (dyestuff)	0.0002
F.D. & C. Red #40 (dyestuff)	0.0005
	100.0000%

The formulation was prepared by the following procedure:

Phase 1 - Use Variable Speed Agitator

1. Start Phase 1 by adding deionized Water (81.3293 %) into a large mixing tank. Start agitator at higher speed.
2. Add Trisodium Citrate dihydrate and agitate until clear.
3. Add Potassium Sorbate and agitate until clear.
4. Add Sodium Bicarbonate and agitate until clear.
5. Add Sodium Carbonate and agitate (liquid should be clear).

Phase 2 - Use Variable Speed Agitator

6. Start Phase 2 by adding deionized Water (5 %) to a second, smaller mixing tank. Start to agitate at medium speed.
7. Add sodium lauryl sulfate (Stepanol WA-100®) and agitate until clear.
8. Add F.D. & c Yellow #6 (dyestuff) and agitate until clear.
9. Add F.D. & C Red #40 (dyestuff) and agitate (liquid should be clear).
9a. Reduce mixing speed in Phase 1 tank.
10. Pump Phase 2 into Phase 1 tank.
11. Add 5% deionized Water into Phase 2 tank and agitate for 10 minutes, then pump into Phase 1 tank and agitate for 1 hour (liquid should be clear).

Phase 3 - Use Variable Speed Agitator

12. Start Phase 3 by adding Lemon Fragrance (IFF Fragrance # 6703AP) to a third, smaller mixing tank. Start to agitate at medium speed.
13. Add cold press lemon oil (#P-3410-Sunkist) and agitate until clear.
14. Add butylated hydroxyanisole (Antioxidant) and agitate until clear.
15. Add Polyoxyethylene(20)sorbitan monolaurate (Tween-20®) and agitate until clear.
16. Add preheated Polyoxyethylene(20)mono- and diglycerides of stearic, palmetic and myristic acids (Durfax EOM®) and agitate until clear. (Melt Durfax EOM® at 38 °C maximum)
17. Add diacetyl tartaric acid ester of a monoglyceride (Panodan TR®) and agitate until clear.
18. Add propylene glycol and agitate (liquid should be clear).

Phase 4

19. Add ethanol slowly into Phase 1 tank and agitate for 30 minutes at low speed (liquid should be clear).
20. Very slowly, add Phase 3 into Phase 1 tank and agitate slowly until clear.
21. Rinse Phase 3 tank with Phase 1 tank liquid, pump into Phase 1 tank and agitate slowly until clear.

EXAMPLE II

The formulation of Example I was tested for its ability to remove various solid from hard surfaces in the following manner:

Typical Stain Removal Test

Objective:

To evaluate all purpose cleaners for efficiency in removal of various soils.

Apparatus:

1. 1.36 kg of weighted cheesecloth.
2. Vinyl and formica panels.
3. Blue pen ink.
4. Black China marker.
5. Shoe polish - black.

Procedure for Testing All Purpose Cleaners:

1. Clean all panels before starting.
2. Divide panels into sufficient strips for testing all cleaners in the study. (For 3 experimental cleaners and a control, we need 4 strips.)
3. Soil each panel with one of the above soils.

Cleaning Procedure:

1. Place 1 ml of cleaner on the soil.
2. Wait 30 seconds.
3. Wipe with 3 lb weighted cheesecloth, 5 complete strokes.
4. Repeat steps 1, 2 and 3 enough times to completely eliminate the soil.
5. Record the total number of ml cleaner used and the total number of strokes necessary to clean off the soil.

Baked Safflower Oil Test

1. Clean and dry baked enamel, cover with an aluminum sheet with 4 openings (3.8 cm x 6.3 cm).
2. Place the baked enamel in the hood at a 45° angle.
3. Use a spray tool to spray the panel.
4. Place the spray tool 12 inches away from the panel, spray the safflower oil horizontally from left to right 4 times. A thin film of oil should be visible.
5. Remove the aluminum sheet and bake the panel for 4 minutes at 260 °C.

Cleaning Procedure:

Wait 2 hours before using the panels.

a. Place 1 ml of cleaner on the soil.
b. Wait 30 seconds.
c. Wipe with 1.36 kg weighted cheesecloth to complete strokes.
d. Repeat steps a), b) and c) enough times to completely eliminate the soil.

A well known, commercially available household. cleaner, containing harsh chemicals (Fantastik® from Dow Brands), was tested as comparison cleaner in a similar manner for comparison purposes. The results of this experiment are set out in Table 1.

TABLE 1

Soil: Pen Ink
Substrate: Formica

Test No.	Formulation of Ex. I	comparison cleaner
1	8 ml/40 wipes	7 ml/35 wipes
2	7 ml/35 wipes	5 ml/25 wipes
3	8 ml/40 wipes	5 ml/25 wipes
4	8 ml/40 wipes	6 ml/30 wipes
5	8 ml/40 wipes	6 ml/30 wipes
Average:	7.8 ml/39 wipes	5.8 ml/29 wipes

Soil: Crayon
Substrate: Formica

Test No.	Formulation of Ex. I	comparison cleaner
1	8 ml/40 wipes	6 ml/36 wipes
2	7 ml/35 wipes	6 ml/36 wipes
3	7 ml/35 wipes	6 ml/36 wipes
4	6 ml/30 wipes	5 ml/25 wipes
Average:	7.2 ml/36 wipes	5.6 ml/32 wipes

Soil: Polymerized Safflower Oil
Substrate: Appliance Panel

Test No.	Formulation of Ex. I	comparison cleaner
1	9 ml/45 wipes	5 ml/25 wipes
2	10 ml/50 wipes	5 ml/25 wipes
3	8 ml/40 wipes	4 ml/20 wipes
4	9 ml/45 wipes	6 ml/30 wipes
5	8 ml/40 wipes	6 ml/30 wipes
Average:	8.8 ml/44 wipes	5.2 ml/26 wipes

From the data of Table 1, it can be determined that the formulation prepared as described in Example I has cleaning power equivalent to that of the comparison cleaner. A difference of 3 to 5 ml with 15 to 25 wipes is not a significant difference in this test. This was confirmed via a consumer usage panel in which typical consumers compared a formula similar to that of Example I to the used comparison cleaner. Results from this study showed that consumers do not perceive a difference in cleaning performance between the composition of the present invention and the used comparison cleaner.

EXAMPLE III

The cleaning composition of the present invention was subjected to various toxicological tests to determine its safety for use as an all purpose cleaner in areas where food preparation takes place. The results of these tests are summarized in Table 2.

TABLE 2

Test	Result
Acute Oral Limit Test (50,000 mg/kg)	>50,000 mg/kg
Ocular Irritation	(no irritation)
Dermal Irritation	(no irritation)
Ames Test	Neg w/activation
	Neg w/o activation

Claims

1. An aqueous cleaning composition which comprises in addition to water:
   a) cold pressed citrus oil;
   b) an alkali metal carbonate and/or an alkali metal bicarbonate in sufficient quantity to maintain the pH of the composition at a level of from about 7.5 to 11;
   c) an emulsifier-surfactant system comprising:
      i. a mono fatty acid ester of polyoxyethylene sorbitan,
      ii. an ethoxylated mono or diglyceride,
      iii. a tartaric acid ester of a mono or diglyceride, and
      iv. sodium lauryl sulfate;
   d) ethanol; and
   e) a minor amount of propylene glycol.

2. The composition of Claim 1 wherein there is present on a weight basis:
   a) 0.05 to 10.0% cold pressed citrus oil;
   b) up to about 1% sodium carbonate and/or sodium bicarbonate in a ratio to each other sufficient to maintain the pH of the composition at a level of from 8.5 to 10.4;
   c) from 0.15 to 5.0% of an emulsifier-surfactant system comprising on a weight basis of this system:
      i. 0.05 to 80.0% of a fatty acid ester of polyoxyethylene sorbitan,
      ii. 0.05 to 20.0% of an ethoxylated mono or diglyceride,
      iii. 0.05 to 20.0% of a tartaric acid ester of a mono or diglyceride, and
      iv. 0.05 to 40.0% sodium lauryl sulfate;
   d) 0.5% to 15% ethanol; and
   e) 0.05 to 2.0% propylene glycol.

3. The composition of Claim 1 wherein there is present on a weight basis:
   a) 0.3 to 1.4% citrus oil;
   b) 2.0 to 4.0% of an emulsifier-surfactant system comprising on a weight basis of the emulsifier surfactant system:
      i. 50 to 65% of a fatty acid ester of polyoxyethylene where the fatty acid residue can contain from 12 to 18 carbon atoms and is prepared by the esterification of sorbitol with the appropriate fatty acids under conditions which cause the splitting of water from the sorbitol and condensing the resultant with approximately 20 moles of ethylene oxide per mole of sorbitol,
      ii. 4 to 7% of a mixture of polyoxyethylene mono and diglycerides of stearic, palmitic and myristic acids,
      iii. 4 to 7% of the diacetyl tartaric acid ester of a monoglyceride, and
      iv. 25 to 35% sodium lauryl sulfate,
   c) 2.5 to 7.0% ethanol; and
   d) 0.2 to 0.8 propylene glycol.

4. The composition of Claims 1-3 wherein the citrus oil is lemon oil.

5. The composition of Claim 1 wherein the amounts and ratio to each other of the alkali metal carbonate and bicarbonate are selected so as to provide a composition having a pH of from 8.5 to 10.4.

6. The composition of Claim 2 wherein the citrus oil is lemon oil.

7. The composition of Claim 3 wherein the citrus oil is lemon oil.

8. The aqueous cleaning composition of Claim 1 wherein there is included various fragrances, preservatives and dyes.

9. An aqueous cleaning composition which comprises:
   a) 0.05 to 10.0% cold pressed citrus oil;
   b) up to about 1% of sodium carbonate and/or sodium bicarbonate in a ratio to each other sufficient to maintain the pH of the composition at a level of from 8.5 to 10.4;
   c) from 0.15 to 5.0% of an emulsifier-surfactant system comprising, on a weight basis of this system:
      i. 0.05 to 80.0% of a fatty acid ester of polyoxyethylene where the fatty acid residues can contain from 12 to 18 carbon atoms and is prepared by the esterification of sorbitol with the appropriate fatty acids under conditions which cause the splitting of water from the sorbitol and condensing the resultant with approximately 20 moles of ethylene oxide per mole of sorbitol,
      ii. 0.05 to 20.0% of a mixture of polyoxyethylene mono and diglycerides of stearic, palmitic and myristic acids,
      iii. 0.05 to 20.0% of the diacetyl tartaric acid ester of a monoglyceride, and
      iv. 0.5 to 40.0% sodium lauryl sulfate;
   d) 0.5 to 15% ethanol; and
   e) 0.05 to 2.0% propylene glycol.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 92 10 6925

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 375 474 (LES DERIVES RESINES-ET TERPENIQUES) * examples *	1,3,5,8	C11D3/18 C11D3/43 A23P1/00
A	FR-A-2 564 105 (SOCIETE DES LESSIVES SAINT-MARC) * page 4, line 14 - line 32; claims 1,3,4 *	1,3,8	
A	EP-A-0 040 882 (PROCTER & GAMBLE) * page 15, line 25 - page 16, line 3; claim 1; examples *	1-4	
A	WO-A-8 702 698 (THOMAS CHRISTY LTD.) * page 2, line 15 - line 25; claims 1-7; examples *	1	
A	US-A-4 533 487 (C.L. JONES) * claim 1 *	1,4	

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

C11D
A23P

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 AUGUST 1992	GRITTERN A.G.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P0401)